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ULTRATHIN-WALLED BOTTLE FORMED BY STRETCH BLOW MOLDING
[Enshin burooseikei ni yoru chouusuniku botoru]

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[Claims] /2*

[Claim 1] With respect to a bottle made of a synthetic resin obtained by vertically stretching an injection-molded preform in a blow die, expanding it in the lateral direction by means of air blow, and making the walls of the section of the bottle consisting of the shoulder part, which is located below the neck part, and the barrel part to be ultrathin,

an ultrathin-walled bottle obtained by stretch blow molding and characterized by forming the above shoulder part in a manner such that its walls will have the thickness of between 0.2 and 0.3mm and by forming the barrel part, which starts from the boundary with the shoulder part, and the portion below in a manner such that their walls will have the ultrathin thickness of between 0.02 and 0.05mm so that they can be pushed into the shoulder part at the time of disposal.

[Claim 2] An ultrathin-walled bottle defined in Claim 1 obtained by stretch blow molding, characterized by the periphery of the boundary between the shoulder part and barrel part being depressed in the shape of a ring for finger hooking and by many levels of lateral ribs of optional shapes being formed in the barrel part at predetermined intervals to provide the barrel part with deformation strength.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention] This invention relates to an ultrathin-walled bottle formed by stretch-blowing a preform composed of an injection-molded thermoplastic resin, such as polyethylene

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* Claim and paragraph numbers correspond to those in the foreign text.

terephthalate.

[0002]

[Problem that the Invention is to Solve] There is a plan to enforce a recycling law regarding packaging bottles made of polyethylene terephthalate generally utilized as pet bottles, and in light of this, attempts are being made to reduce the amount of the resins used, to lower the weights, and to improve the transportation efficiency.

[0003] The thicknesses of the barrels of frequently-used conventional bottles for beverages having capacities of between 500 and 1000cc are between about 0.25 and 0.3mm. There are exceptional bottles that are thicker, but their barrels, while they can be crushed, cannot be stored in a folded condition. Moreover, even if a bottle has a foldable structure, it contributes only to decreasing the bulk of the barrel and not to drastically decreasing the amount of resin used or lowering the weight. Therefore, it is unrealistic to expect a significant effect in increasing the transportation volume and stockpile.

[0004] This invention was devised in light of the above situation, and its aim is to decrease the thicknesses of the bottles, specifically to form the bottles to have ultrathin walls in the barrel part and the portion below it, and to thereby supply ultrathin-walled bottles which are capable of realizing efficient transportation and stockpiling as a result of the decreased amount of resin used, lower weight, and smaller disposal sizes and which are therefore also capable of improving the economic efficiency of recycling.

[0005]

[Means for Solving the Problems] This invention, which has the above aim, is a bottle made of a synthetic resin obtained by vertically stretching an injection-molded preform in a blow die, expanding it in the lateral direction by means of air blow, and making the portion of the bottle that consists of the shoulder part, which is located below the neck part, and the barrel part to have ultrathin walls. It is specifically obtained by forming the above shoulder part in a manner such that its walls will have the thickness of between 0.2 and 0.3mm and by forming the barrel part, which starts from the boundary with the shoulder part, and the portion below it in a manner such that their walls will have the ultrathin thickness of between 0.02 and 0.05mm so that they can be pushed into the shoulder part at the time of disposal.

[0006] Moreover, according to this invention, the periphery of the boundary between the shoulder part and barrel part is depressed in the shape of a ring for finger hooking, and many levels of lateral ribs of optional shapes are formed in the barrel part at predetermined intervals to provide the barrel part with deformation strength.

[0007] An ultrathin-walled bottle having the above structure has a shoulder part that has walls approximately as thick as the walls of the barrel part of a regular bottle and also has a barrel part and the part below it that have walls much thinner than the walls of the shoulder part. Therefore, it requires a smaller amount of resin than a regular bottle and is therefore lighter. Moreover, since its bulk can be reduced at the time of disposal by having the barrel part and below it pushed into the shoulder part, it is possible to transport and stockpile a large

amount of [these bottles] for recycling. Therefore, the expenses required by transportation and stockpiling as well as the efforts related to collection can be reduced, and the economic efficiency of recycling is improved.

[0008]

[Embodiment of the Invention] The figure illustrates a circular bottle for beverages that is made of polyethylene terephthalate (PET) and that has a capacity of about 500cc. Reference numeral 1 denotes the neck part that has not been stretched, 2 denotes the shoulder part, 3 denotes the barrel part, and 4 denotes a bottom part having a domed-shaped center. The part from the shoulder part 2 to the bottom part 4 is made to have walls thinner than the walls of the neck part 1 by means of stretch blow molding.

[0009] Although omitted in the drawing, this bottle is formed in the same manner as a regular stretch-blown bottle by axially stretching a preform, which is composed of a neck part that will be the neck of the bottle without being altered and a bottom-equipped barrel part that will form the shoulder part to the bottom part after being subjected to stretch blowing, at the bottom-equipped barrel part and by also expanding it in the lateral direction by means of air blow inside a blow die while holding the neck part.

[0010] The thickness of the above shoulder part 2 is made to be between 0.2 and 0.5mm, which is less than the thickness (between 2.2 and 2.5mm) of the non-stretched neck part 1, by means of the above stretch blow molding. Moreover, the thickness of the walls of the portion from the barrel part

3 to the bottom part 4 is made to be between 0.02 and 0.05mm, which is drastically thinner than the walls of the shoulder part, which starts from the boundary 5 of the shoulder part 2. Since the bottom part 4 will have the load of the content applied to it, its walls should preferably be thicker than the walls of the barrel part 3.

[0011] The periphery of the above boundary 5 is depressed in the shape of a ring by means of inward bending of the lower end 2a of the shoulder part, and the ring-shaped depression allows the lower end 2a of the shoulder part to be used for finger hooking so that the bottle can be held or tilted without the ultrathin-walled barrel part 3 being grasped.

[0012] Moreover, since the barrel part 3 having the thickness between 0.02 and 0.05mm is susceptible to deformation as a result of even a slight lateral pressure and the self-standing properties of the bottle may become lost when the bottle is empty prior to the content being filled, the periphery of the barrel part 3 has provided to it many levels of a large number of wavy, symmetrical lateral ribs, 6 and 6, at predetermined intervals so that [the barrel part] is provided with deformation strength without making it impossible for the bottle to be crushed. Moreover, although it is omitted in the drawing, it is permissible to reinforce the strength of the bottom by also forming ribs radially in the bottom part 4, in which case the reinforcement should be limited to a degree that will still allow the bottom part 4 to be crushed at the time of disposal.

[0013] In this manner, a bottle having an ultrathin-walled barrel

part, which is between 0.02 and 0.05mm in wall thickness, drastically reduces the amount of resin used as well as substantially decreases the weight. Therefore, as illustrated in Figure 2, it can be crushed in the area from the barrel part 3 to the bottom part 4 easily by a hand after being used. Moreover, since the walls of the barrel part and the portion below it are ultrathin, the bottle will not be bulky when it is casually rolled up or folded after being crushed. Moreover, when pushed into the shoulder part in the above condition, the [rolled up or folded up] portion can be almost entirely contained inside the shoulder part 2, and therefore, the used bottle can be reduced in size to the combined size of the neck part 1 and shoulder part 2 and can be put in a recycling bag used in each household.

[0014] Therefore, since the amount of bottles that can be contained in a bag used in each household is increased compared to conventional regular bottles, the amount that can be collected each time is increased, and the transported and stockpiled amounts also increase, consequently decreasing the expenses required for these operations. Moreover, the amount of resin used per bottle decreases drastically, and the bottle's cost is also lowered. Therefore, the economic efficiency of recycling will improve greatly.

[Brief Description of the Figures]

[Figure 1] A front view of an ultrathin-walled bottle of the invention obtained by means of stretch blow molding, showing a half of it as a vertical cross-section.

[Figure 2] A vertical cross-sectional front view of the above

ultrathin bottle at the time of disposal.

[Explanation of the Reference Numerals]

1 = neck part

2 = shoulder part

2a = lower end of shoulder part

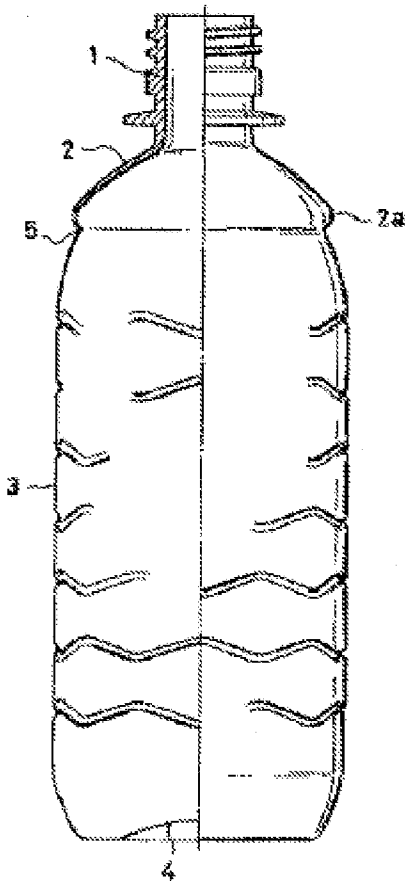
3 = barrel part

4 = bottom part

5 = boundary

6 = lateral rib

[Figure 1]



[Figure 2]